HRSD - Bringing Time and Space Together for Operational Awareness in Waste Water

Presented by Kimberly Peterson, Data Analysis Manager, HRSD
Clay Wise, Chief of IT Operations & Support, HRSD
Agenda

• Outline
  – Who is HRSD
  – Operational Data Issues / Concerns
  – PI System Deployment
  – Real-time Data is Geospatial Context
  – HRSD Data Center
  – HRSD’s Future Goals
HRSD - Introductions

• Kimberly Peterson
  – Data Analysis Manager

• Clay Wise
  – Chief of IT Operations and Support
Who is HRSD
HRSD - Mission

- We protect public health and the waters of Hampton Roads by treating wastewater effectively.

- HRSD is recognized as a leader in the industry, with an impressive record of environmental permit compliance.
HRSD - Vision

HRSD VISION:
Future generations will inherit clean waterways and be able to keep them clean.
HRSD - History

- 1920s – Estimated 25 mg of raw sewage entering local waters daily
  - By mid-1920s, over 10,000 acres or oyster beds were condemned
- 1927 - VA General Assembly created a commission to investigate and survey the seafood industry
- March 27, 1934 - Hampton Roads Sewage Disposal Commission (HRSDC) is established
- November 5, 1940 - the referendum to create HRSD was approved.
- Now – HRSD treats 249 million gallons per day

Read the fascinating history of HRSD’s creation by public referendum at www.hrbsd.com/history
HRSD A Political Subdivision of the Commonwealth of Virginia

HRSD serves 17 counties and cities.

Serving the Cities of:
Chesapeake, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, Williamsburg

And the Counties of:
Gloucester, Isle of Wight, James City, King William, Mathews, Middlesex and York
HRSD – Fast Facts

• Year Created:
  – 1940

• Type of Agency:
  – Governor-appointed political subdivision of the Commonwealth of Virginia

• Population Served:
  – 1.7 million (nearly 1/4th of VA’s population)

• Collection System:
  – More than 500 miles of pipes, 6 to 66 inches in diameter

• Pump Stations:
  – ~112

• Treatment Plants:
  – 9 major plants in Hampton Roads and 4 smaller plants on the Middle Peninsula

• Combined Capacity:
  – 249 million gallons per day
HRSD Operational Data
HRSD’s Monitoring Network

- 160 flow meters
- 156 pressure sensors
- 74 rain gauge
- 21 groundwater shallow well sensors
- NOAA Tide Data
- Multiple Weather Stations
- Collecting Pump Station data
  - RPMs, Drive Outputs, Wet Well Level
HRSD’s Monitoring Network

• Data collected through telemetry and ethernet / ip protocol
• Most data collected at 2-min intervals
• Data is collected by Telog® recorders in the field
• Data is collected by the PI Server from the Telog® server through a PI Interface for RDBMS.
Challenges for HRSD

- Regulatory compliance data growing too large in current SQL database
- Current data growth and the need to keep large amounts of “raw” data.
- The same information is in many different databases and available for viewing for customers in different applications.
- HRSD saw a need to plan for future expansion of data collection
PI System Deployment
HRSD – PI System Architecture

Built for:
- Redundancy
- Visibility both internal, and external clients.
- Transparency
- Web based solution to maximize user base.
HRSD – PI System / ArcGIS Architecture

- **HA** – High Availability
- **PICore** – Web based solution for non spatial data.
- **PIINT** – Location data.
- **PIAF** – Asset-based data
- Web based through ArcGIS Online.
Real-time Data in Geospatial Context
HRSD – PI Integrator for Esri ArcGIS
HRSD – PI Integrator for Esri ArcGIS

Histogram quickly displays distribution of pressure in the system.
HRSD – PI Integrator for Esri ArcGIS

Widget displays Top 15 Pressures in the system.
HRSD - Future Goals

- Mobile Workforce
- Interceptor Crews
  - React faster to system issues.
  - Increased safety during inclement weather events.
HRSD Data Center
HRSD Data Center

IT Data Centers

North Shore Data Center

<table>
<thead>
<tr>
<th>Alarm Level (°F)</th>
<th>Current Temp (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East 74.00</td>
<td>69.94</td>
</tr>
<tr>
<td>West 74.00</td>
<td>69.52</td>
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</tbody>
</table>

South Shore Data Center

<table>
<thead>
<tr>
<th>Alarm Level (°F)</th>
<th>Current Temp (°F)</th>
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</thead>
<tbody>
<tr>
<td>Rack 101-6</td>
<td>83.48</td>
</tr>
<tr>
<td>Rack 104-1</td>
<td>77.63</td>
</tr>
<tr>
<td>Rack 104-11</td>
<td>76.64</td>
</tr>
<tr>
<td>Rack 107-5</td>
<td>73.08</td>
</tr>
</tbody>
</table>

IT Emergency Contact List

<table>
<thead>
<tr>
<th>Home Phone</th>
<th>Mobile Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nick Boardman</td>
<td></td>
</tr>
<tr>
<td>John Peake</td>
<td></td>
</tr>
<tr>
<td>Robert Walling</td>
<td></td>
</tr>
<tr>
<td>Amy Wood</td>
<td></td>
</tr>
<tr>
<td>Shawn Williams</td>
<td></td>
</tr>
<tr>
<td>Clay Wise</td>
<td></td>
</tr>
</tbody>
</table>

Useful Websites and Local Weather

- HRSD’s Telog Web Module
- National Hurricane Center
- WunderMap
- NWS Forecast for Norfolk, VA
HRSD Data Center – South Shore

South Shore IT Data Center Temperatures

- Current value is located near the rack in the above diagram.
HRSD Data Center – North Shore

North Shore IT Data Center Temperatures

Outside temperature is measured at the Newport News/Williamsburg International Airport.
Data Center Sensor Implementation

• Current Sensors
  – Collected by Telog® Recorders
    • 4 Ambient Temperature Sensors in SS Ops DC.
    • 2 Ambient Temperature Sensors in NS Ops Server Room.
Data Center Sensor Implementation

- Up to 60 RF Sensors are being installed.
- They will each collect temperature and humidity every 10 seconds.
- Alarming is very helpful to minimize the impact of thermal events.
Data Center Sensor Implementation

- 5 year battery life.
- 18 sensors for the North Shore Server Room.
Data Center Sensor Implementation

- Small Communities Division
- In design phase.
- Plan to design space using a lessons learned approach.
- Estimating 16 sensors at this location.
Ultimate Data Center(s) goals

• To be responsive.
• True high availability.
• A private cloud.
• Plan for the future of HRSD.
  – VDI
  – More jurisdictions
  – SCADA
Building Automation
Building Automation

- Monitoring
  - Across departments
- Alarming!
- Preventative maintenance
- Web-viewing of Data
**Summary**

<table>
<thead>
<tr>
<th>COMPANY and GOAL</th>
<th>SOLUTION</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRSD protects public health and the waters for 17 cities and counties in Hampton Roads, VA by treating wastewater effectively. Our vision is that future generations will inherit clean waterways and be able to keep them clean.</td>
<td>The OSIsoft PI System as a data infrastructure offered the most robust solution evaluated.</td>
<td>Ease of deployment, speed of data delivery and connectivity standards.</td>
</tr>
</tbody>
</table>

### Challenge

- HRSD saw a need to plan for future expansion of operational data collection.

### Solution

- Performance, scalability, availability, security and functionality.

### Results

- Fast deployment of the system.
- Expansion in scope for future proofing operational data.
- Improved awareness and efficiencies in Operations.
Contact Information

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Questions

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감사합니다

Danke

谢 谢

Merci

Gracias

Спасибо

Obrigado

ありがとう